Overview

HP StorageWorks Modular SAN Array 1000

The HP StorageWorks Modular SAN Array 1000 is a 2 Gb Fibre Channel storage system designed for the entry-level to mid-range Storage Area Network (SAN). Designed to reduce the complexity, expense and risk of SAN deployment, the msa1000 is a scaleable, high performance storage system built with investment protection in mind. The modular design of the msa1000 allows the user to easily add storage capacity on an as needed basis.

The msa1000 combines the array controller shelf and the drive shelf, which holds up to fourteen 1″ universal disk drives in a single 4U rackmount cabinet. More storage can be easily deployed with the addition of up to two StorageWorks 4314 or 4214 Enclosures for a maximum storage capacity of 6 TB when using the new 146 GB drives. The msa1000 provides the latest 2 Gb Fibre Channel technology to the hosts. Besides the single port 2 Gb Fibre Channel I/O module that comes standard, there is an optional 6-port, 2 Gb Fibre Channel Fabric Switch that fits inside the msa1000. A recent optional addition is a 3-port 2 Gb Fibre Channel hub that also fits inside – an ideal low cost solution for simple 2-node clustering. The msa1000 provides Ultra3 SCSI connections to the hard drives and uses the HP Universal 1″ Ultra2, Ultra3, and/or Ultra320 drives. By utilizing existing SCSI drives, the msa1000 lowers the total cost of ownership and extends the customer's hardware investments into the future. The msa1000 can be remotely managed by using management tools such as HP Insight Manager – XE, Array Configuration Utility – XE and the StorageWorks Fabric Switch Management Utility.

Recent updates to the msa1000's controller firmware offer support for NetWare® and Linux® operating systems along with the original support for Microsoft® Windows® NT® and Windows 2000. This updated firmware also supports multiple clusters and/or single servers accessing an msa1000.

The msa1000 offers the following key features

- High performance controller(s) built on DAS to SAN {DtS} architecture for maximum investment protection
- 4U rack mount design combining both the controller and disk shelf
- 2 Gb Fibre Channel host connections
- Optional embedded 6-port 2 Gb Fibre Channel Fabric Switch or 3-port 2 Gb Fibre Channel hub
- Ultra3 SCSI connections to drives
- Support for HP Ultra2, Ultra3, and Ultra320 Universal 1" Drives
- Scaleable from 3 to 42 drives via StorageWorks 4200/4300 Enclosures
- Support for 1 Gb and 2 Gb Fibre Channel fabrics

What's new

- Multiple clusters and/or single server access by all supported OSes to an individual msa1000. See Note
- Support for concurrent access by servers with Microsoft, NetWare, and Linux operating systems
- Support for NetWare 5.1 & 6.0 operating systems
- Support for Red Hat® Professional 7.2, Red Hat Advanced Server 2.1, and SuSE® 7.2.

NOTE: At present both Microsoft and NetWare OSes have Secure Path available. Therefore Microsoft and NetWare clusters and/or single servers running Secure Path can concurrently access an msa1000. Secure Path support for Linux is planned for a later introduction. Until that time, Linux clusters or single servers cannot access the same msa1000 being accessed by clusters or servers with Microsoft or NetWare running Secure Path software.

	Concurrent access, single paths, no Secure Path on any node, single controller.	Concurrent access, with Secure Path (clusters or single servers), dual controllers
Microsoft OSes	✓	✓
NetWare OSes	✓	✓
Linux OSes	✓	

- Redundancy (if present) retained while expanding number of drives or enlarging LUNs
- New 3-port embedded hub option
- Ability to add an additional storage drive enclosure (42/4300) to a msa1000 without power cycling unit
- Ability to add an additional clusters to an existing msa1000 SAN without power-cycling the msa1000
- Support for larger and/or faster drives allowing total capacity to scale to 6 TB

MSA1000 Highlights

High Levels of Performance, Scalability, and Functionality

- **Performance** – The msa1000 and its components have been designed using the latest industry standard 2 Gb interconnects and Fibre Channel technology. Performance tests indicate a data transmission rate of over 30, 000 IOPS and bandwidth of up to 200 MB per second. (Single msa1000 Controller)
- **Modular Chassis –** The modular design of the msa1000 cabinet supports up to fourteen 1″ Universal hard drives, redundant controllers, 2 Gb embedded fabric switches or hubs, fans and power supplies in a 4U rackmount cabinet.
- **Scalability –** The msa1000 is easily expanded. The msa1000 cabinet scales to **2.0 TB**, using fourteen, 146 GB, 1″ HP Universal hard drives. By simply adding additional StorageWorks 4200/4300 Enclosures (two enclosures max), the msa1000 scales to **6.0 TB**, using forty-two, 146 GB, 1″ HP Universal hard drives – all within 10U of rack space.
- **Modular SAN Array Fabric Switch 6 –** The optional MSA Fabric Switch 6, which can be installed within the msa1000 cabinet, offers 2 Gb full fabric performance, at an attractive price. A second MSA Fabric Switch 6 can be installed for redundancy. There are four "fixed" ports and one pluggable port (SFP not included). The sixth port is directed internally to the controller.
- **MSA Hub 2/3 –** The optional MSA Hub 2/3, to be installed within the msa1000, offers 2 Gb performance. With two ports accessible by the user, the MSA Hub 2/3 is the ideal interconnect for low-cost 2-node clustering or simple attaching two servers. A second MSA Hub 2/3 can be installed for redundancy. This hub ships with two SFPs included.
- **Hot Plug Expansion and Replacement Support –** The msa1000 supports hot plug expansion and replacement of hard drives, redundant controllers, fabric switches or hubs for simple, fast installation and maintenance. Fans and power supplies are also hot plug replaceable.
- **Advanced Data Guarding (RAID ADG) Fault Tolerance –** This is the highest level of fault tolerance. It allocates two sets of parity data across drives and allows simultaneous write operations. This level of fault tolerance can withstand two simultaneous drive failures without downtime or data loss.

DtS Architecture (Direct Attach to SAN) **Data Migration**

DtS (Direct Attach to SAN) architecture is an exclusive msa1000 feature that provides a quick and easy way to migrate stored data protected by most Smart Array controllers to an msa1000 storage system.

Data that is currently stored on 1″ Universal disk drives using newer HP Smart Array controllers, as well as data on an ra4100 can easily be migrated to the msa1000. Simply remove the drives from the older systems and insert them into the msa1000. All configuration information and data will be preserved allowing migration to be completed in minutes, not hours or days. Refer to the msa1000 DtS Data Migration White Paper for a list of compatible Smart Array controllers and further details.

MSA1000 Highlights

Low Total Cost of Ownership

The modular and scalable design of the msa1000 provides an extremely flexibly platform. You can buy what you need today and purchase additional capacity and performance as your data storage needs grow, instead of making a large up-front investment. Additional drives, controllers, cache, fabric switches and storage enclosures can easily be added, as your storage needs change.

- **Fabric Support for 1 Gb and 2 Gb Infrastructure –** The msa1000 supports both 1 Gb and 2 Gb Fibre Channel fabrics to ensure that your investment in 1 Gb infrastructure is protected.
- **Optional embedded interconnects –** Both the MSA Fabric Switch 6 and the MSA Hub 2/3 require no rack space as they are installed in the msa1000's chassis. This not only saves valuable rack space (up to 2U saved) but also eliminates some of the cabling needed with external interconnects.
- **Universal Hard Drive –** Since the msa1000 supports HP Universal 1″ Ultra2 and Ultra3 drives, your investment in SCSI technology is protected and cost is minimized as you add new drives. Sharing of a common universal drive form factor between your servers and storage can significantly reduce needs for hardware and spare inventory, and offer overall reduction in storage management and business costs.
- **Pre-Failure Warranty –** Drives installed in an msa1000 and monitored under Insight Manager are supported by a Pre-Failure (replacement) Warranty. **NOTE:** Pre-Failure Warranty allows for the replacement of designated drives in an msa1000 before they actually fail when using Insight Manger on ProLiant servers. **NOTE:** Some operating systems may not support all of these features.
- **Multi-platform Intel® -based Server Support –** The msa1000 offers Multi-platform Intel-based (x86) server support to allow a broad range of Intel-based servers to take advantage of the msa1000's scalability, flexibility and connectivity. When used with a ProLiant server, the msa1000 also provides unparalleled integration with Insight Manager, msa1000 Support CD and Pre-Failure Warranty support.
- **Integrated Configuration and Management Tools –** The msa1000 utilizes a standard, integrated set of management and utility software. These tools consistently lower the cost of ownership by reducing training and technical expertise necessary to install and maintain HP storage.

The msa1000 comes with/supports the following configuration and management tools:

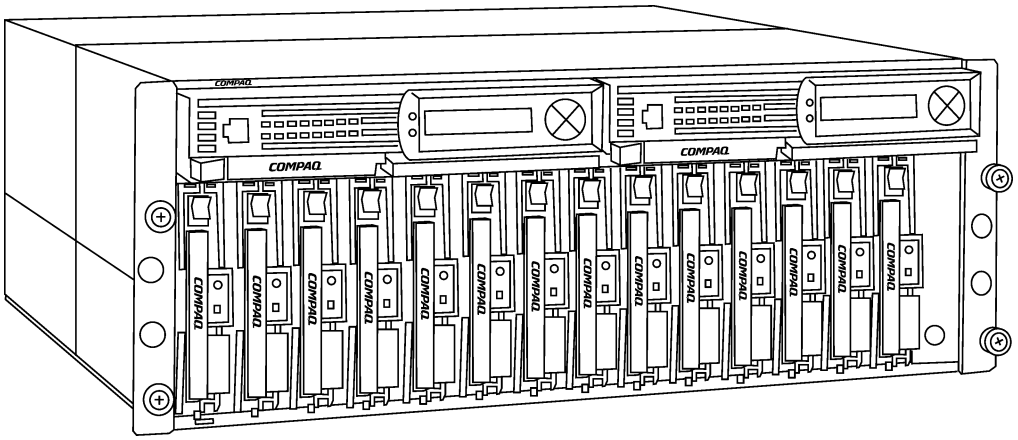
Configuration	• **Array Configuration Utility (ACU).** ACU is a browser-based disk configuration utility that lets you view, set up, and configure the array controllers and storage systems. • **Command Line Interface (CLI)**
Management/Health	• **Insight Manager (CIM)** • **Array Diagnostics Utility (ADU)** This utility collects information about the array controllers in the system and generates a list of potential problems it has identified. It produces a report that can be saved to a diskette and analyzed by support technicians to aid in problem resolution.
ACU / ADU Bootable Utility	• The **msa1000 Support Software CD** is a bootable media that enables a server to boot into a Linux shell and launch the ACU or the ADU, allowing the user to configure the msa1000 storage or generate a diagnostic report without requiring a pre-installed operating system or drivers.

Compatibility

Servers	Supports 32-bit ProLiant servers and multi-vendor industry standard 32-bit Intel-based (x86) servers.

Models

HP StorageWorks Modular SAN Array 1000	msa1000, with 256MB cache	201723-B22
	msa1000 Controller, with 256MB cache	218231-B22
	256 MB Cache Module for Controller	254786-B21
	MSA Fibre Channel I/O Module	218960-B21
	MSA Hub 2/3 (integrated)	286763-B21
	MSA Fabric Switch 6 (integrated)	218232-B21
	FCA2101 Host Adapter (Microsoft)	245299-B21
	FCA2210 Host Adapter (NetWare)	281540- B21
	FCA2214 Host Adapter (Linux)	281541-B21
	2 Gb SFP SW Transceiver Kit	221470-B21
	HP StorageWorks Enclosure Model 4314R	190209-001
	HP StorageWorks Dual bus Enclosure Model 4354R	190211-001
	HP StorageWorks Secure Path v4 for Windows Workgroup Edition	213076-B23
	HP StorageWorks Secure Path for NetWare	222411-B22
	ProLiant Cluster HA/F100 for msa1000 for NT 4.0 and Windows 2000 (dual server, single path)	252408-B22
	ProLiant Cluster HA/F200 for msa1000 for NT 4.0 and Windows 2000 (dual server, dual path)	252409-B22
	ProLiant Cluster HA/L100 LifeKeeper™ for Linux	303523-B21



MSA1000 Components

With the following components, your storage capacity and performance can be scaled to new levels:

Modular SAN Array 1000

The 4U cabinet houses up to fourteen 1″ Universal hot pluggable Ultra2, Ultra3, and/or Ultra320 drives. Each msa1000 includes the following standard components: (1) msa1000 Controller, (1) MSA Fibre Channel I/O Module with a single SFP, dual hot pluggable fans/power supplies and power cables, (2) 3′ VHDCI to VHDCI SCSI cables to connect expansion enclosures, documentation and a support software CD.

The modular design of the msa1000 makes it possible to add redundant controllers, redundant single port Fibre Channel I/O Modules, 3-port hub, or Fabric Switches and storage expansion enclosures.

msa1000 Controller

The msa1000 Controller is an integrated RAID controller with an integrated LCD/LED status display and 256 MB read/write battery-backed cache (expandable to 512 MB per controller). One msa1000 Controller is included with the msa1000; a redundant msa1000Controller is an option.

Key Features

- Redundant controller support with mirrored cache
- Fabric, Private Loop & Public Loop Support
- Auto Negotiated F, FL & L Port Login
- RAID 0, 1, 1+0, 5 and ADG
- 2 Gb/1 Gb Frequency Agile
- Primary & Secondary Inter-Controller Link (ICL)
- Host based configuration via ACU
- Optionally configurable with Command Line Interface (CLI)
- Remote configuration and monitoring via ACU XE (offline and remote) & CIM XE

msa1000 Controller Management Features

- **Selective Storage Presentation**: allows multiple hosts to access a single msa1000 storage system. Host access can be defined all the way down to a logical volume level.
- **Online RAID Level Migration**: allows for online post-configuration change to RAID level without destroying data or volume information.
- **Online Capacity Expansion**: lets you add storage to an operational msa1000—reducing expensive server downtime.
- **Global Online Spare**: reduces the risk of data loss by facilitating automatic rebuilds after a drive failure.

Fault Tolerance

Several fault tolerant configurations, which keep data available and servers running while drives are being replaced, are supported including:

- Advanced Data Guarding (RAID ADG): Allocates the equivalence of two parity drives across multiple drives and allows simultaneous write operations.
- Distributed Data Guarding (RAID 5): Allocates parity data across multiple drives and allows simultaneous write operations.
- Drive Mirroring (RAID 1, (1+0 Striped Mirroring)): Allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file.

Fault Recovery

Minimizes downtime, reconstructs data, and facilitates a quick recovery from drive failure:

- **Online Spares**: If a failure occurs, recovery begins with an online spare and data is reconstructed automatically. Multiple online spares can be assigned per array and used across multiple arrays. It is also possible to assign different online spares across different arrays.
- **Array Accelerator**: Onboard, battery-backed cache memory protects data in the event of a power failure. In the unlikely event of a controller failure, the battery-backed cache will save critical user data for up to three days.

MSA1000 Components

MSA Fibre Channel I/O Module

Provides a single 2 Gb Fibre Channel connection per controller from the host side into the msa1000. The MSA Fibre Channel I/O Module includes one 2 Gb, Short Wave, Small-Form-Factor-Pluggable Transceiver (SFP). A second MSA Fibre Channel I/O Module can be installed for redundancy when a redundant controller is used.

MSA Fabric Switch 6

The MSA Fabric Switch 6 is an optional six port, 2 Gb Fibre Channel Fabric Switch. The MSA Fabric Switch 6 replaces the standard single port Fibre Channel connection provided by the Modular SAN Array Fibre Channel I/O Module. There are a total of five external Fibre Channel ports. Four of the external Fibre Channel ports are Small-Form-Factor-Fixed (SFF) short wave transceivers and are not removable. The fifth port requires the installation of a Small-Form-Factor-Pluggable (SFP) transceiver. One port is used internally by the msa1000 controller. The MSA Fabric Switch 6 can only cascade one time and only to another MSA Fabric Switch 6.

Key Features

- 2 Gb 6-port Fabric Switch integrated into the msa1000 chassis
- 5-ports external, 1-port internal
- Four Small-Form-Factor-Fixed Short Wave (SFF) Transceivers, One Small-Form-Factor-Short Wave Pluggable (SFP) Transceiver
- 2 Gb/1 Gb Frequency Agile
- Managed In and Out of Band
- Hot Pluggable
- Efficient, space saving design

NOTE: The MSA Fabric Switch 6 cannot be cascaded to an external Fabric Switch. It can be cascaded once to another Fabric Switch 6. See the msa1000 Compatibility Matrix for details.

MSA Hub 2/3

The HP StorageWorks MSA Hub 2/3 is a low-cost interconnect designed for clustering or low cost, high speed attachment of two servers to the msa1000, an entry-level storage area network (SAN) solution. The MSA Hub 2/3 is a 3-port Fibre Channel Arbitrated Loop hub that is mounted on a blade that easily installs inside the msa1000 storage unit, saving valuable rack space. Two of these hubs may be installed for redundancy within the msa1000. The MSA Hub 2/3 is not cascadable.

The hub presents the user with two SFP ports for simple direct attachment to two single or clustered servers without having to purchase an external interconnect device. It offers the most cost-effective solution for a user to enable a clustered server environment.

- High-Performance: supports msa1000 with a 2 Gb interconnect capable of 200 MB/s speed
- Low Cost: supports the entry-level SAN array with the most cost effective option for 2-node clustering
- Compact: imbeds in the msa1000, replacing the I/O module, saving valuable rack space
- Complete: comes with two SW SFPs – no need for further investment

2 Gb Small Form Factor Pluggable (SFP) **SW Transceiver Kit**

2 Gb Small-Form-Factor-Pluggable (SFP) SW Transceivers are industry standard connection devices, which hot plug into 2 Gb infrastructure components such as 2 Gb Fabric Switches. StorageWorks 2 Gb SFP SW Transceivers support distances up to 300 meters at 2 Gb and 500 meters at 1 Gb using multi-mode fiber optic cable.

Multi-Mode Fibre Channel Cables

Multi-Mode Fibre Channel cables provide a thin, flexible cabling solution that is immune to electromagnetic interference. HP offers cables to connect the msa1000 to both 2 Gb and 1 Gb Fibre Channel infrastructures. LC to LC cables are used when connecting the msa1000 to other 2 Gb Fibre Channel components because both connections will utilize small form factor transceivers. LC to SC cables are used when connecting the msa1000 to 1 Gb Fibre Channel components. 1 Gb components use the larger GBIC style transceivers.

Software Components

The msa1000 utilizes a single, consistent set of utility software for storage and RAID management, setup, configuration and troubleshooting. This consistency reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your HP storage solution.

Array Configuration Utility

- Provides a graphical view of HP drive array configurations
- Easy to use Wizards for configuration
- ACU supports on-line configuration
- Web Based ACU-XE supports On-Line, Remote Web Based and Off-line configuration
- Runs online on Microsoft Windows NT 4.0 and Microsoft Windows 2000

Selective Storage Presentation (SSP)

- Built-in to msa1000 Controller firmware and controlled via ACU
- Allows setting of access rights to the msa1000 storage by hosts
- Access control can be set up to a logical volume level using the Array Controller Utility

Insight Manager (CIM)

- Powerful storage, server and server option management tool
- Monitor storage from a remote central location
- Browser based CIM provides full access from anywhere on the Intranet, eliminating the need for a dedicated Insight Manager management console

HP OpenView storage virtual replicator, one license ships standard

Virtual Replicator combines a rich set of innovative capabilities that enhances and simplifies storage management for Windows NT and Windows 2000 environments. Through virtualization, online volume growth, snapshot and management features, the software complements the standard capabilities within the operating system. HP OpenView storage Virtual Replicator provides virtualization for flexible, simplified storage management on Windows based servers. An OpenView Virtual Replicator CD with a single system license and ten 60-day evaluation licenses are included with the msa1000. Additional licenses of Virtual Replicator are available through your local HP sales office.

Key Features

- Support for NT and Windows 2000
- **Virtualization** – Allows companies to respond quickly to rapidly changing storage capacity requirements. With storage virtualization, multiple storage arrays can be consolidated into a pool of disk space for individual or clustered systems to use. Multiple virtual disks, up to 2 terabyte in size, can be created from a pool for users and their applications. System administrators can tailor disk space to specific requirements. Existing storage units with production data can be imported into a pool, the data partition being preserved as a virtual disk and unused capacity added to the pool.
- **Online volume growth** – Enables easy, non-disruptive growth for Windows 2000 with zero downtime. Online Volume Growth allows a system administrator to grow an existing volume on an HP OpenView Virtual Replicator virtual disk and also a Windows 2000 basic disk. The system will remain online, and the data on the volume will remain intact.
- **Snapshots** – Instant, point-in-time snapshots for backup, online restore, testing or data mining. Enable the instant creation of multipurpose virtual replicas of production data without the requirement of a physical copy Snapshots function identically to ordinary physical disks, with both read and write capability. Whenever a quick copy of production data is needed, snapshots can be used with minimal disruption to running applications. For example, the snapshot can be the source for backup using standard backup tools. Snapshots can remain online for restore operations, testing, and data mining.
- **Management** – Simplifies management tasks through easy-to-use interfaces using Microsoft Management Console or a command line. Interactive wizards are available to guide the administrator through all management tasks and create automatic schedules of operations for investment protection and to reduce staff retraining.
- Fully cluster-aware
- Command line interface for scripting
- Scheduling wizards remove the guesswork from repetitive operations

Please refer to the Optional Software section of this document or visit http://www.hp.com/ for additional details.

Software Components

OS Support

- Microsoft Windows 2000 Server and Advanced Server (sp3)
- Microsoft Windows NT 4.0 Server and Enterprise Edition (sp6a)
- NetWare 5.1 and 6
- Red Hat Linux Personal/ Professional 7.2 (no Secure Path available at this time. LifeKeeper clustering available from SteelEye™, not HP)
- Red Hat Linux Advanced Server 2.1 (no Secure Path available at this time)
- SuSE Linux SLES7 (no Secure Path available at this time)

Please refer to compatibility matrix for complete configuration support.

Software Certifications

- Microsoft Cluster Server Certification

Please refer to compatibility matrix for complete configuration support

Optional Software

Secure Path

Secure Path is a family of high availability multi-pathing software products providing continuous data access from the HP RAID Array to host servers running the Windows 2000, Windows NT, and NetWare operating systems.

Redundant hardware, advanced RAID technology and Secure Path's automated failover capability are used to enhance fault tolerance and availability. Secure Path effectively eliminates controllers, disk drives, interconnect hardware and host bus adapters as single points of failure in the storage subsystem.

If any single node or cluster attached to an msa1000 utilizes Secure Path, all connected nodes and/or clusters must have Secure Path also

Key Features

- Maintains connections to storage
- Monitors I/O paths and alerts on significant events

Used in

- Stand Alone Configurations
- Cluster configurations
- SAN configurations

msa1000 clustering

Clustering is rapidly gaining in popularity as users desire a high level of data availability. Many of the old cluster restrictions that were the product of both hardware and operating systems have been overcome. While there still remain configuration limits, the result is a new high degree of flexibility both in number of clusters, mixing clusters with single nodes, and the integration of dissimilar operating systems.

The user may attach up to a maximum of three Microsoft clusters to a single msa1000. This is only a limit to the number of Microsoft clusters, not a limit to the number of devices that may share concurrent access. For example you may mix three Microsoft clusters and other individual servers, even doing so in a heterogeneous server operating system environment (adhering to rule that if one node or cluster has Secure Path software, all attached servers and/or clusters must also have that software).

Single-path (single controller, non-Secure Path) NetWare clustering has been successfully tested up to a 12-node cluster. Multiple NetWare clusters (and single servers) may have concurrent access with no limitation inherent to the msa1000. Likewise up to a 16-node Linux cluster utilizing LifeKeeper clustering software has been tested and is supported.

The msa1000 has the ability to be configured with thirty-two LUNs. This limitation boundary establishes the maximum number of nodes that can be connected to an msa1000. Best practices would dictate no more than sixteen servers accessing a single msa1000. More commonly, users have had an average of five to eight nodes. This can be any combination of nodes or clusters with different operating systems while holding fast to the guidelines and limits described in the above paragraphs. Performance within these guidelines is heavily dependent on the actual number of end users and types of applications being employed.

For more information, click on the link below:
http://h18000.www1.hp.com/solutions/enterprise/highavailability/index.html

HP ProLiant Cluster HA/F200 for msa1000 (Microsoft)

The ProLiant Cluster HA/F200 for msa1000 uses HP's industry-leading ProLiant servers, HP StorageWorks Modular SAN Array 1000, Ethernet server to server interconnect, and HP's industry-leading installation and systems management utilities.

The ProLiant Cluster HA/F200 for msa1000 kit delivers a higher level of availability in cluster environments by enabling multi-path Fibre Channel connections. Secure Path management software, included with the kit, features support for a redundant Fibre Channel infrastructure (two paths through the Fibre Channel hub or Fabric Switch) utilizing dual Host Bus Adapters in each server connected to one or more msa1000 storage subsystems, each with dual RAID controllers.

HP ProLiant Cluster HA/F200 for msa1000 (Microsoft)	252408-B22

HP ProLiant Cluster HA/F100 for msa1000 (Microsoft)

The ProLiant Cluster HA/F100 for msa1000 is a robust, integrated cluster solution providing high availability for applications and data in business-critical environments. An ideal platform for business-critical databases, large business applications, email or file/print services, the ProLiant Cluster HA/F100 for msa1000 offers Fibre Channel-based clustering at a fraction of the cost of proprietary cluster solutions.

The ProLiant Cluster HA/F100 for msa1000 exploits HP's industry-leading servers, HP StorageWorks Modular SAN Array 1000, Ethernet interconnect and HP's leading installation and systems management utilities. Cluster Management is provided by Microsoft's Cluster Server software, included as part of Microsoft NT Server 4.0 Enterprise Edition, and Microsoft Windows 2000 Advanced Server.

HP ProLiant Cluster HA/F100 for msa1000 (Microsoft)	252409-B22

Optional Software

HP ProLiant Cluster HA/L100 LifeKeeper for Linux

The HP ProLiant Cluster HA/L100 Cluster Kit provides for a one-stop product to facilitate the implementation of a two to 16 server node Linux based high availability cluster solution to protect applications and data in a business-critical environment. The HA/L100 supports HP ProLiant servers in mix and match configurations from the ML330 to the DL760 and the ISS Smart Array Cluster Storage Systems as well as the ra4100, msa1000, and ma8000 shared fibre storage subsystems. The kit includes a Cluster Installation Guide for ProLiant Servers, storage and the two Linux distributions supported: Red Hat and SuSE. The kit also includes SteelEye Technology's® LifeKeeper for Linux Version 4.1.1 Core cluster software including LifeKeeper Installation and Documentation CD's. The HP ProLiant Cluster HA/L100 supports the industry-standard Linux Distributions from Red Hat and SuSE for base operating systems support and SteelEye LifeKeeper for Linux Version 4.1.1 Core, included in the HA/L100 cluster kit as 30 day evaluation software which can be permanently licensed through SteelEye Technology or one of their resellers or partners.

HP ProLiant Cluster HA/L100 LifeKeeper for Linux	303523-B21

HP ProLiant Clusters for NetWare

HP supports a broad range of solutions for NetWare Cluster services including configurations featuring the msa1000 and optionally with HP StorageWorks Secure Path. These solutions provide high availability and maximum resource utilization for NetWare environments from small file sharing implementations to enterprise business computing. Single-path (single controller, non-Secure Path) NetWare clusters of up to 12-nodes have been successfully tested. Presently 2-node NetWare clusters with Secure Path have been tested and approved with larger NetWare cluster testing planned. Multiple NetWare clusters are allowed.

HP ProLiant Parallel Database Clusters for Oracle on msa1000

The HP Parallel Database Clusters (PDC) for Windows and Linux provide the industry's leading platform for deployment of Oracle 9i Real Application Clusters. The PDC is a multi node (up to six in Microsoft environments and up to four with Linux)) shared-storage clustering environment that enables industry standard Windows and Linux platforms to deliver performance previously limited to very large SMP (16 to 32 processor) environments. Every server node in the cluster has concurrent read-write access to the common shared database built on the msa1000 storage SAN. The multi-node architecture is inherently highly available, loss of any single node results in some degradation of performance but the database remains active and accessible. When optimally integrated with Oracle load balancing and transparent application reconnect features, clients are completely insulated from the loss of a server resource or an Oracle instance failure on a node. To complement the high availability of the server cluster in a Windows environment, the Parallel Database Cluster integrates HP StorageWorks Secure Path for fully redundant access to the database in the even of any failure in SAN connectivity. Secure Path for Linux will be available at a later date. Combined, the Oracle clustering technology and HP platform technology deliver cost effective and highly available enterprise solutions for database applications.

Oracle 9i Real Application Clusters will operate with Microsoft and Linux in a single path environment, and Microsoft also in a dual-controller multi-path environment.

Service & Support, CarePaq and Warranty Information

Storage Service Packages

The Storage Services Packaging takes the existing storage product along with the existing services and creates a package of the storage hardware and appropriate services. The increased level of support provides for a higher level of storage system availability for the customer. The package includes 24x7 support with a 4-hour response for 3 years as well as installation and startup service.

Warranty

Three-year Limited Warranty for msa1000s, Fibre Channel Cables and SFP Transceivers; 3 years parts exchange; 1 year labor; 1 year on-site; next business day response. Options for the msa1000 carry their own warranty. Refer to HP's Limited Warranty Statement for further details.

Service & Support, CarePaq and Warranty Information

Software Product Services

- HP warrants only that the Software media will be free of physical defects for a period of ninety (90) days from delivery.
- Upgrades to the 90 day media defect warranty are available as CarePaq services. These services are available to upgrade the warranty to (1 or 3) full year of 9 hours by 5 days (or 24x7) software advisory and remedial software telephone support, new version license rights, and media and documentation distribution service.

Hardware Product Services

- Installation services
- On-site maintenance (includes warranty support)
- Response time upgrades during the warranty period
- Post-warranty coverage
- RAID setup and performance consulting via statement of work
- Migration service consulting via statement of work

Installation and Startup Services

The Installation and Startup Service package provides installation and configuration of StorageWorks products. Major categories of work could include:

- Pre-installation consulting and planning
- Hardware installation, configuration and verification
- RAID array configuration and initialization
- Installation, configuration and verification of StorageWorks software
- Service tools installed, configured and verified
- Customer orientation

Warranty Upgrade Options

- Response – Upgrade on-site response from next business day to same day 4 hours
- Coverage – Extend hours of coverage from 9 hours x 5 days to 24 hours x 7 days
- Duration – Select duration of coverage for a period of 1, 3, or 5 years

CarePaq Information

Sample part numbers:

9x5, Next Business Day, On-Site Coverage, 3 years	FM-FCXHW-36
9x5, 4-Hour Response, On-Site Coverage, 3 years	FM-FC4HR-36
24x7, 4-Hour Response, On-Site Coverage, 3 years	FM-FC724-36
9x5, Next Business Day, On-Site Coverage, 5 years	FM-FCXHW-60
9x5, 4-Hour Response, On-Site Coverage, 5 years	FM-FC4HR-60
24x7, 4-Hour Response, On-Site Coverage, 5 years	FM-FC724-60
Hardware Installation	FM-FCINS-IN

- CarePaq is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage.
- CarePaq is not available for less than the product's warranty duration.
- CarePaq is available for sale anytime during the warranty period for most products, but the commencement date will be the same as the Warranty Start Date (delivery date to end user customer). Proof of purchase may be required.
- CarePaq services are prepaid.

For additional CarePaq (hardware & software) information on European and other countries, as well as orderable part numbers, please refer to the URL listed below:
http://www.compaq.com/services/CarePaq/index.html

MODULAR SAN ARRAY 1000

LED Indicators on Front (3)	Power	
	Fault detected in one or more sub-systems	
	Fault in Enclosure Management	
LED Indicators for Drive Modules (3)	Drive Access (center)	
	Online (left)	
	Drive Failure (right)	
LED Indicators on Rear Panel (4)	Power Supply/Blower Assembly Fault (1)	
	EMU (3) Power, A bus, B bus	
Interface	Ultra3 SCSI to Hard Drives	
	2 Gb Fibre Channel to Hosts	
Maximum Number of Drives	Fourteen, 1-inch HP Ultra2, Ultra3 or Ultra 320 Universal Hard Drives (msa1000 Cabinet); expandable to 42 using two additional StorageWorks 4200/4300 Enclosures	
Temperature Range	Operating	50° to 95°F/10° to 35°C
	Shipping	–22° to 122°F/–30° to 50°C
	NOTE: Derated 1°C per 1,000 feet of elevation to 10,000 ft.	
Relative Humidity	Operating	10% to 90%
	Non-operating	Up to 95%
Input Power Requirements	Rated Input Voltage	100 to 240 VAC
	Rated Input Frequency	50 to 60 Hz
	Rated Input Current	6 A Max
	Input Power (max)	549 W*
Heat Dissipation (max)	1876 Btu/hr*	
	* Input Power and Heat Dissipation specifications are maximum values and apply to worst-case conditions at full rated power supply load. The power/heat dissipation for your installation will vary depending on the equipment configuration.	
msa1000 Cabinet	4U Rack Form Factor	
	Dimensions (H x W x D)	6.9 x 19 x 20.5 in/17.5 x 48.3 x 52.1 cm
	Weight	Net 55 to 85 lb/24.95 to 38.56 kg
Shipping Packaging	Dimensions (L x W x D)	28.5 x 14.81 x 33.13 in/72.4 x 37.6 x 84.1 cm
	Weight (Gross)	75 to 105 lb/34.02 to 47.63 kg

MODULAR SAN ARRAY 1000 CONTROLLER

User Interface	Controller Display with Status Indicators (2) and Push Buttons (4) Status Indicators on front of Controller (16)	
Electrical Interface	LVD (Low Voltage Differential)	
Protocol Support	Wide Ultra3 SCSI (160 MB/s per channel)	
SCSI Ports	4-channel: 2 external/2 Internal	
Drives Supported	Up to 42 drives	
Maximum Capacity	6.0 TB (42 drives x 146 GB)	
Logical Drives	Up to 32 logical drives	
RAID Support	RAID ADG (Advanced Data Guarding) RAID 5 (Distributed Data Guarding) RAID 1+0 (Striping & Mirroring) RAID 0 (Striping)	
Cache Memory	Up to 512 MB Read/Write (256-MB modules). Added cache size must match original and if a second controller is employed, it too must have equally configured cache. ECC protection, battery-backed, and removable Standard, starting November 19, 2002: 256 MB cache memory (single module)	
Cache Batteries	Up to three days of redundant battery life, removable for easy replacement	
Upgradeable Firmware	2 MB flashable ROM	
Disk Drive and Enclosure Protocol Support	HP Ultra 320, Ultra3, and Ultra2 SCSI 1-inch Universal drives	
Packaging	Dimensions (L x W x D) Weight (Gross)	17 x 12.5 x 7.75 in/43.2 x 31.75 x 19.7 cm 6 lb/2.72 kg

MODULAR SAN ARRAY FIBRE CHANNEL I/O MODULE

Connector Type	LC	
Number of Fibre Channel Ports	One 2 Gb Fibre Channel Port using removable Small-Form-Factor-Pluggable Transceiver (SFP)	
Bandwidth	200 MB/s	
Operation Modes	Fibre Channel Class 2 and 3 connectionless service	
Protocols Supported	Fibre Channel	
Packaging	Dimensions (L x W x D) Weight (Gross)	17 x 12.5 x 7.75 in/43.2 x 31.75 x 19.7 cm 6 lb/2.72 kg

MODULAR SAN ARRAY FABRIC SWITCH 6

Connector Type	LC	
Number of Fibre Channel Ports	Four external Fibre Channel ports using integrated 2 Gb Small-Form-Factor SW Transceiver (SFF)	
	One external Fibre Channel ports using removable 2 Gb Small-Form-Factor SW Pluggable Transceiver (SFP)	
	One internal 2 Gb Fibre Channel Port	
Aggregate Bandwidth	1200 MB/s	
Operation Modes	Fibre Channel Class 2 and 3 connectionless service	
Protocols Supported	Telnet, SNMP	
Switch Management Access	Ethernet (RJ-45, 10/100 Base TX UTP) & Serial port; Out of band Management	
Packaging	Dimensions (L x W x D)	17 x 12.5 x 7.75 in/43.2 x 31.75 x 19.7 cm
	Weight (Gross)	6 lb/2.72 kg

FCA2101 HOST ADAPTER

Connector Type	LC	
Protocol	SCSI, IP	
Data Transfer Method	64-bit/66 MHz PCI	
Maximum Transfer Rate	200 MB/s	
Packaging	Dimensions (L x W x D)	11 x 8.5 x 3 in/27.9 x 21.6 x 7.6 cm
	Weight (Gross)	1 lb/0.45 kg

MULTI-MODE FIBRE CHANNEL CABLES KITS

Cable Type	LC-LC (2 Gb to 2 Gb connections) and LC-SC (2 Gb to 1 Gb connections) 50 Micron multi-mode fibre	
Available Cable Lengths	6.5 ft, 16.4 ft, and 49.2 ft/2 m, 5 m, and 15 m	
Packaging	Dimensions (L x W x D)	11.5 x 9 x 1.5 in/29.2 x 22.8 x 3.8 cm
	Weight (Gross)	0.75 to 1 lb/0.34 to 0.45 kg

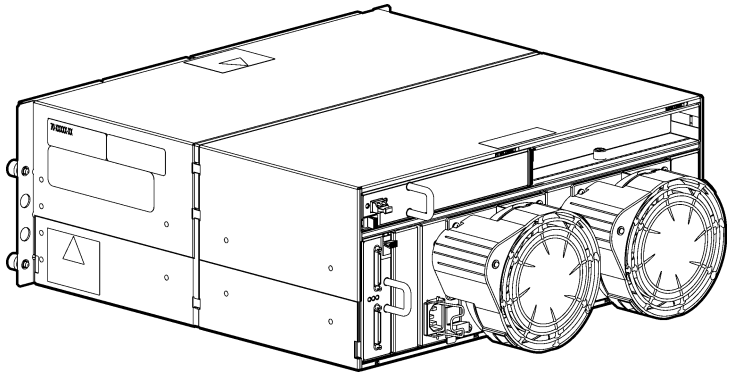
STEP 1 – ORDER REQUIRED ITEMS

HP StorageWorks Modular SAN Array 1000 — 201723-B22

Includes

- (1) msa1000 Controller with 256 MB cache
- (1) MSA Fibre Channel I/O Module with 2 Gb SFP SW Transceiver
- Redundant Hot Pluggable Power Supply/blower assemblies
- Universal Rackmounting Kit
- msa1000 Support CD & Documentation
- (2) Power cables
- (2) 3-ft VHDCI to VHDCI SCSI cables

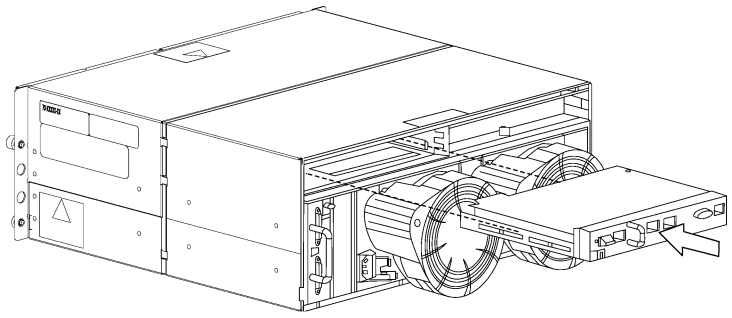
NOTE: Fibre Channel cables are ordered separately.



STEP 2 – CHOOSE OPTIONAL NON-REDUNDANT MSA1000 SYSTEM OPTIONS

MSA Fabric Switch 6 (integrated) (Includes four 2 Gb fixed transceivers)	218232-B21
MSA Hub 2/3 (integrated) (Includes two 2 Gb SFP transceivers)	286763-B21

NOTE: The MSA Fabric Switch 6 has a total of five external Fibre Channel ports. Four of the external Fibre Channel ports are Small-Form-Factor-Fixed SW (SFF) transceivers, which are embedded in the Fabric Switch. The fifth available port requires the installation of a Small-Form-Factor-Pluggable (SFP) transceiver. The MSA Hub 2/3 has two external Fibre Channel ports, both of which already have 2 Gb transceivers installed.
For a non-redundant configuration, remove the 2Gb SFP SW transceiver from the MSA Fibre Channel I/O Module and install it into the MSA Fabric Switch 6. A redundant MSA Fabric Switch 6 will require the purchase of a 2 Gb SFP SW Kit 221470-B21 to utilize the fifth external port.

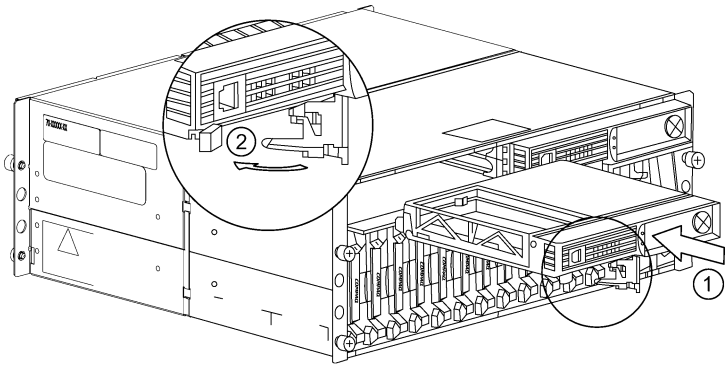


STEP 3 – CHOOSE REDUNDANT MSA1000 SYSTEM OPTIONS

Redundant Configuration

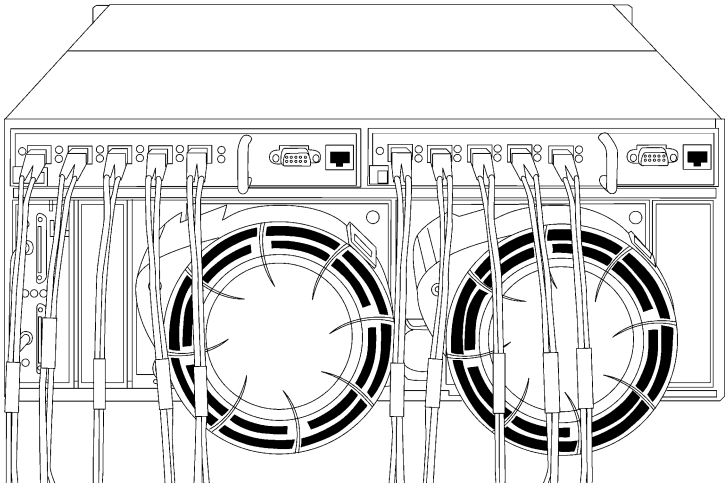
msa1000 Controller	218231-B22

NOTE: Redundant configurations require two Host Adapters per server, an additional controller and I/O or a MSA Fabric Switch 6, and Secure Path software for each server. For Microsoft ProLiant Clusters, Secure Path software can be substituted with the ProLiant Clusters HA/F200 kit.
If any single node attached to an msa1000 utilizes Secure Path, all connected nodes must have Secure Path also. Secure Path for Linux is planned for release at a later date.
Mixing of the MSA Fibre Channel I/O Modular and the MSA Fabric Switch 6 or the MSA Hub 2/3 is not supported. When configuring the msa1000 for redundant controllers use either two MSA Fibre Channel I/O Modules, two MSA Hub 2/3s, or two MSA Fabric Switch 6s.



MSA Fibre Channel I/O Module (Includes 2 Gb SFP transceiver)	218960-B21
MSA Fabric Switch 6 (Includes four 2 Gb fixed transceivers)	218232-B21
MSA Hub 2/3 (integrated) (Includes two 2 Gb SFP transceivers)	286763-B21

NOTE: The MSA Fabric Switch 6 has four external Fibre Channel ports using integrated 2 Gb Small-Form-Factor-Fixed Transceivers (SFF) and one external Small-Form-Factor-Pluggable Transceiver (SFP) Fibre Channel port. Utilization of the Small-Form-Factor-Pluggable Transceiver (SFP) Fibre Channel port requires the installation of a Small-Form-Factor-Pluggable (SFP) transceiver.
Installation of a redundant MSA Fabric Switch 6 will require the purchase of a 2Gb SFP SW Kit (221470-B21) to utilize the Small-Form-Factor-Pluggable Transceiver (SFP) Fibre Channel port.



STEP 4 – CHOOSE SUPPORTED OPTIONS FOR 2 GB OR 1 GB INFRASTRUCTURE

2 Gb Fibre Channel Transceiver (SFP)	2 Gb SFP SW Transceiver Kit	221470-B21
2 Gb Fibre Channel Fabric Integrated Switch	MSA Fabric Switch 6 (integrated option) Four fixed ports (SFF) & 1 pluggable port (SFP)	218232-B21
	NOTE: Interoperable only with another HP StorageWorks MSA fabric switch 6.	
2 Gb Fibre Channel Fabric Switches, "Infrastructure" family of switches	HP StorageWorks core 2/64 (32-ports active)	254508-B21
	HP StorageWorks SAN Switch 2/32	240603-B21
	HP StorageWorks SAN Switch 2/16 with 2 power supplies	287055-B21
	HP StorageWorks SAN Switch 2/16-EL	283056-B21
	HP StorageWorks SAN Switch 2/8-EL	258707-B21
	NOTE: Interoperable only with HP StorageWorks SAN Switch 2/8EL, 2/16EL, 2/16, 2/32 and core 2/64 products.	
2 Gb Fibre Channel Fabric Switches, "High Availability" family of switches	HP StorageWorks Director 2/140 (64-ports active)	316094-B21
	HP StorageWorks director 2/64	286809-B21
	HP StorageWorks edge switch 2/32 (16 active ports)	286810-B21
	8-FlexPort upgrade for edge 2/32	302660-B21
	HP StorageWorks edge switch 2/16	286811-B22
	HP StorageWorks Edge switch 2/24 (8 ports active)	316095-B21
	8-FlexPort upgrade for edge 2/24	316096--B21
	NOTE: Interoperable only with HP StorageWorks Director 2/140. Director 2/64, Edge Switch 2/32, Edge Switch 2/24, and Edge Switch 2/16 products.	
2 Gb Fibre Channel Integrated Hub	MSA Hub 2/3 (integrated option, comes complete with two SFPs)	286763-B21
2 Gb Fibre Channel HBAs	FCA2101 Host Adapter (Microsoft OS)	245299-B21
	FCA2210 Host Adapter (NetWare OS)	281540-B21
	FCA2214 Host Adapter (Linux OS)	281541-B21
Fibre Channel Cables for 2 Gb Infrastructure	Use 2 Gb Fibre Channel cables when connecting the MSA Fibre Channel I/O Module or the MSA Fabric Switch 6 to FCA2101 HBA(s)	
	2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
	5 m LC-LC Multi-Mode Fibre Channel Cable	221692-B22
	15 m LC-LC Multi-Mode Fibre Channel Cable	221692-B23
	30 m LC-LC Multi-Mode Fibre Channel Cable	221692-B26
	50 m LC-LC Multi-Mode Fibre Channel Cable	221692-B27

STEP 4 – CHOOSE SUPPORTED OPTIONS FOR 2 GB OR 1 GB INFRASTRUCTURE *(continued)*

1 Gb Fibre Channel Fabric Hub	Fibre Channel Storage Hub 7	234453-001
	Fibre Channel Storage Hub 7 (Int'l)	234453-B31
	Fibre Channel Storage Hub 7 (Japan)	234453-291
	Fibre Channel Storage Hub 7 Universal Rack Mount Kit	136127-B21
	GBIC-SW Connector Kit (2 ea.)	234459-B21
	GBIC-LW Connector Kit (2 ea.)	340412-B21
Fibre Channel Cables for 1 Gb Fabric Switches and Hub	Use 1 Gb Fibre Channel cables when connecting the MSA Fibre Channel I/O Module and FCA2101 HBA(s) to 1 Gb fabric switches or hubs.	
	2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
	5 m LC-SC Multi-Mode Fibre Channel Cable	221691-B22
	15 m LC-SC Multi-Mode Fibre Channel Cable	221691-B23
	30 m LC-SC Multi-Mode Fibre Channel Cable	221691-B26
	50 m LC-SC Multi-Mode Fibre Channel Cable	221691-B27

STEP 5 – CHOOSE HARD DRIVES & STORAGEWORKS ENCLOSURES

Hard Drives	36.4 GB Pluggable Ultra 3 Universal Hard Drive, 15,000 rpm (1″)	232916-B22
	18.2 GB Pluggable Ultra 3 Universal Hard Drive, 15,000 rpm (1″)	188122-B22
	72 GB Pluggable Ultra3 Universal Hard Drive, 10,000 rpm (1″)	232432-B22
	36.4 GB Pluggable Ultra3 Universal Hard Drive, 10,000 rpm (1″)	176496-B22
	18.2 GB Pluggable Ultra3 Universal Hard Drive, 10,000 rpm (1″)	142673-B22
	36.4 GB Pluggable Ultra320 Universal Hard Drive, 10,000 rpm (1″)	286713-B22
	72.8 GB Pluggable Ultra320 Universal Hard Drive, 10,000 rpm (1″)	286714-B22
	146.8 GB Pluggable Ultra320 Universal Hard Drive, 10,000 rpm (1″)	286716-B22
	18.2 GB Pluggable Ultra320 Universal Hard Drive, 15,000 rpm (1″)	286775-B22
	36.4 GB Pluggable Ultra320 Universal Hard Drive, 15,000 rpm (1″)	286776-B22
	72.8 GB Pluggable Ultra320 Universal Hard Drive, 15,000 rpm (1″)	286778-B22
	*__NOTE__: All Ultra320 Universal Hard Drives are backward compatible to U2 or U3 speeds.	
	__NOTE__: For complete compatibility information, refer to the HP SCSI Hard Drive Compatibility table located at: www.hp.com/servers/hdd-documentation.	

STEP 5 – CHOOSE HARD DRIVES & STORAGEWORKS ENCLOSURES *(continued)*

StorageWorks Enclosures

The msa1000 cabinet holds fourteen 1" Universal Drives. Add one StorageWorks Enclosure to increase capacity up to 28 drives. Add two StorageWorks Enclosures to increase capacity up to the maximum of 42 drives.

StorageWorks Enclosure Model 4314R (Maximum of two can be connected to the msa1000)	190209-001
StorageWorks Enclosure Model 4314R (Maximum of two can be connected to the msa1000) (Int'l)	190209-B31
StorageWorks Enclosure Model 4314R (Maximum of two can be connected to the msa1000) (Japan)	190209-291
StorageWorks Enclosure Model 4354R (Maximum of one can be connected to the msa1000)	190211-001
StorageWorks Enclosure Model 4354R (Maximum of one can be connected to the msa1000) (Int'l)	190211-B31
StorageWorks Enclosure Model 4354R (Maximum of one can be connected to the msa1000) (Japan)	190211-291

STEP 6 – CHOOSE RACK OPTIONS

9142 Rack	120663-B21, -B22, -B23
9136 Rack	120664-B21, -B22, -B23
9122 Rack	120665-B21, -B22, -B23
9842 Rack	222192-B21
10647 (47U) rack	245160-B21, -B22, -B23
10642 (42U) rack	245161-B21, -B22, -B23
10636 (36U) rack	245162-B21, -B22, -B23
10622 (22U) rack	245163-B21, -B22, -B23

CONFIGURATION EXAMPLES

Two Node Redundant Cluster Solution

Quantity	Description	Part Number
1	HP StorageWorks Modular SAN Array 1000	201723-B22
1	msa1000 Controller	218231-B22
2	MSA Hub 2/3	286763-B21
4	Host Adapter (appropriate model for operating system)	
6	2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
1	ProLiant Cluster HA/F200 for msa1000	252409-B22
14	36.4 GB Pluggable Ultra3 Universal Hard Drive, 15K	232916-B21

4 Host, 1.5TB, Redundant SAN Solution

Quantity	Description	Part Number
1	HP StorageWorks Modular SAN Array 1000	201723-B22
1	msa1000 Controller	218231-B22
2	256 MB Cache Modules for Controller (one additional for each controller)	254786-B21
1	MSA Fibre Channel I/O Module	218960-B21
1	2 Gb SFP SW Transceiver Kit	221470-B21
2	SAN Switch 2/8-EL	258707-B21
8	Host Adapter (appropriate model for operating system)	
8	2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
4	Secure Path v4.0 for Windows Workgroup Edition (1 license per server) if NT,W2K	213076-B22
2	StorageWorks Enclosure Model 4314R	190209-001
42	36.4 GB Pluggable Ultra3 Universal Hard Drive, 15K	232916-B22

Related Options

SANworks Virtual Replicator v3.0	1 license	261770-B21
	3 license	266236-B21
	5 license	261775-B21
	10 license	261771-B21
	25 license	261772-B21
	50 license	261773-B21
	Base Media and Documentation Kit (license required)	261769-B23
Secure Path V3.0C for NetWare Workgroup Edition	Secure Path v3.0C for NetWare for RA4x00 one license	222411-B22
	Secure Path v3.0C for NetWare for RA4x00 five licenses	231324-B22
	Secure Path v3.0C for NetWare for RA4x00 10 licenses	231325-B22
	Secure Path v3.0C for NetWare for RA4x00 25 licenses	231326-B22
	Secure Path v3.0C for NetWare for RA4x00 50 licenses	231327-B22
Secure Pathv4 for Windows Workgroup Edition	(Package includes separate programs for both the msa1000 and the ra4000 and ra41000 solutions.)	
	Secure Path v4 for Windows Workgroup one license	213076-B23
	Secure Path v4 for Windows Workgroup Edition five licenses	231316-B23
	Secure Path v4 for Windows Workgroup Edition 10 licenses	231317-B23
	Secure Path v4 for Windows Workgroup Edition 25 licenses	231318-B23
	Secure Path v4 for Windows Workgroup Edition 50 licenses	231319-B23
	Secure Path v4 for Windows Workgroup Edition Upgrade	261715-B21
ProLiant Cluster for MSA1000	ProLiant Cluster HA/F100 for msa1000 v2	252409-B22
	ProLiant Cluster HA/F100 for msa1000 v2 (Japan)	252409-292
	ProLiant Cluster HA/F200 for msa1000 v2	252408-B22
	ProLiant Cluster HA/F200 for msa1000 v2 (Japan)	252408-292

Related Options

Competitive information (November 2002)

Vendor	HP	Dell	Dell	Dell	Dell	IBM	IBM
Model	msa1000	CX200	CX400	FC4500	FC4700-2	FastT200	FastT500
Max. Capacity (GB)	6 TB	2.2 TB	4.4 TB	18.1 TB	21.7 TB	9.6 TB	32 TB
Device Interface Types	Ultra2/3/320 SCSI	FC-AL	FC-AL	FC-AL	FC-AL	FC-AL	FC-AL
Max. Number of Drives	42	30	60	100	120	66	220
Host platforms	Windows NT, Windows 2000, NetWare, Linux	Windows NT, Windows 2000, Linux (future NetWare)	Windows NT, Windows 2000, SUN Solaris, HP-UX, IBM AIX, NetWare Linux	Windows NT, Windows 2000, SUN Solaris, HP-UX, IBM AIX, NetWare Linux	Windows NT, Windows 2000, SUN Solaris, HP-UX, Tru64, IBM AIX, NetWare, Linux, Irix	Windows NT, Windows 2000, SUN Solaris, HP-UX, AIX, NetWare, Linux	Windows NT, Windows 2000, SUN Solaris, HP-UX, AIX, NetWare, Linux
Drives Supported	18 GB, 36 GB, 73 GB 146GB	36 GB, 73 GB	36 GB, 73 GB	18 GB, 36 GB, 73 GB, 181 GB	18 GB, 36 GB, 73 GB, 181 GB	18 GB, 36 GB, 73 GB, 146GB	18 GB, 36 GB, 73 GB, 146GB
Max Cache Size (MB)	512	1024	2048	2048	2048	256	1024

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